U.S. Department of Energy Orders Self-Study Program

10 CFR 835

OCCUPATIONAL RADIATION PROTECTION

ALBUQUERQUE OPERATIONS OFFICE

Change No: 0
10 CFR 835
Level: Familiar
Date: 6/2/98

10 CFR 835
OCCUPATIONAL RADIATION PROTECTION
FAMILIAR LEVEL

OBJECTIVES

Given the Familiar Level of this module and the resources, you will be able to perform the following:

1. State the purpose of implementing 10 CFR 835.
2. Define the following terms.
   - airborne radioactive material area
   - annual limit on intake
   - bioassay
   - contamination area
   - declared pregnant worker
   - high contamination area
   - occupational exposure
   - absorbed dose
   - collective dose
   - external dose
   - internal dose
   - weighting factor
   - whole body
3. State the requirements of the general rule.
4. State the radiological units authorized to be used in records required by 10 CFR 35.
5. State the radiation protection program requirements.
6. State the requirements of the internal audit.
7. Describe the conditions that must be met before a radiological worker is authorized to receive planned special exposure.
8. State what the estimation of internal dose shall be based on for all conditions.

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9. Describe the conditions under which personnel dosimetry shall be provided to monitor exposres to external radiation for the following groups.
    - radiological workers
    - declared pregnant workers
    - minors and members of the general public
10. State the conditions under which internal dose evaluation programs shall be performed for the following groups.
    - radiological workers
    - declared pregnant workers
    - minors and members of the general public
11. State the entry control program requirements to enter the following areas.
    - radiological area
    - high radiation area
    - very high radiation area
12. State the requirements of the individual monitoring records.
13. State what information shall be documented and maintained for monitoring and workplace records.
14. State the requirements for the facility design and administrative control to maintain radiation exposure in controlled areas as low as reasonably achievable (ALARA).
15. State the objectives to be used in designing new, or modifying old, facilities with regard to ALARA.
16. State what the facility design features and administrative control procedures must provide during routine operations.
17. Discuss the requirements and the guidelines for control of emergency exposure situations.

Note: If you think that you can complete the practice at the end of this level without working through the instructional material and/or examples, complete the practice now. The course manager will check your work. You will need to complete the practice at this level successfully before taking the criterion test.

RESOURCES

10 CFR 835, Occupational Radiation Protection, 12/14/93.

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INTRODUCTION

The Familiar Level of this module is divided into two sections. In the first section, we will discuss the purpose of 10 CFR 835 and the terms associated with the regulation. In the second section, we will discuss the requirements in the regulation. We have provided examples throughout the module to help familiarize you with the material. The examples will also help prepare you for the practice at the end of this module and the criterion test.

Most of what you will need to know to complete this module is contained in the module. However, before continuing, you should obtain a copy of the regulation. Copies of the regulation are available on the Los Alamos National Laboratory Website at http://iosun.lanl.gov:1776/htmls/directives.html or through the course manager. You may need to refer to the regulation to complete the examples, practice, and criterion test.

SECTION 1 INTRODUCTION

PURPOSE

The rules in this part establish radiation protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from the conduct of DOE activities.

Exclusion. The requirements in this part do not apply to:

- Activities that are regulated through a license by the Nuclear Regulatory Commission or a State under an Agreement with the Nuclear Regulatory Commission, including activities certified by the Nuclear Regulatory Commission under section 1701 of the Atomic Energy Act;
- Activities conducted under the authority of the Director, Naval Nuclear Propulsion Program, as described in Pub. L. 98- 525;
- Activities conducted under the Nuclear Explosives and Weapons Safety Program relating to the prevention of accidental or unauthorized nuclear detonations; or
- Background radiation, radiation doses received as a patient for the purposes of medical diagnosis or therapy, or radiation doses received from voluntary participation in medical research programs.

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DEFINITIONS

10 CFR 835 contains several definitions. Some of those definitions are repeated here for your convenience. These definitions may differ from those contained in the regulation. Additionally, terms that are in the regulation but not in this section may appear in the examples, practice, and/or the criterion test. Therefore, it is important that you are familiar with the regulation and this instructional material.

Absorbed Dose

The energy absorbed by matter from ionizing radiation per unit mass of irradiated material at the place of interest in that material. The absorbed dose is expressed in units of rad (or gray) (1 rad = 0.01 gray).

Airborne Radioactive Material

Radioactive material in any chemical or physical form that is dissolved, mixed, suspended, or otherwise entrained in air.

Annual Limit on Intake (ALI)

The derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year.

Bioassay

The determination of kinds, quantities, or concentrations, and, in some cases, locations of radioactive material in the human body, whether by direct measurement or by analysis, and evaluation of radioactive materials excreted or removed from the human body.

Collective Dose

The sum of the total effective dose equivalent values for all individuals in a specified population. Collective dose is expressed in units of person-rem (or person- sievert).

Contamination Area

Any area where contamination levels are greater than the values specified in appendix D of this regulation, but less than or equal to 100 times those levels.

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Declared Pregnant Worker

A woman who has voluntarily declared to her employer, in writing, her pregnancy for the purpose of being subject to the occupational exposure limits to the embryo/fetus as provided in this regulation. This declaration may be revoked, in writing, at any time by the declared pregnant worker.

External Dose

That portion of the dose equivalent received from radiation sources outside the body.

High Contamination Area

Any area where contamination levels are greater than 100 times the values specified in appendix D of this regulation.

Internal Dose

That portion of the dose equivalent received from radioactive material taken into the body.

Occupational Exposure

An individual's exposure to ionizing radiation (external and internal) as a result of that individual's work assignment.

Weighting Factor

The fraction of the overall health risk, resulting from uniform, whole body irradiation, attributable to specific tissue (T). The dose equivalent to tissue, T, is multiplied by the appropriate weighting factor to obtain the effective dose equivalent contribution from that tissue.

Whole Body

For the purposes of external exposure, head, trunk (including male gonads), arms above and including the elbow, or legs above and including the knee.

Note: You do not have to do example 1 on the following page, but it is a good time to check your skill or knowledge of the information covered. You may do example 1 or go to Section 2.

EXAMPLE 1

Using the Familiar Level of this module and the resources, complete the following exercises.

1. State in your words what the DOE hopes to achieve by implementing 10 CFR 835.

2. Define the following terms
   Annual Limit on Intake

   High Contamination Area

   Weighting Factor

Quality Factor

Total Effective Dose Equivalent

Note: When you have finished, compare your answers to those contained in the example 1 self-check. When you are satisfied with your answers, go to Section 2.

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EXAMPLE 1 SELF-CHECK

1. State in your words what the DOE hopes to achieve by implementing 10 CFR 835.
   To establish radiation protection standards, limits, and program requirements for protecting individuals from ionizing radiation resulting from the conduct of DOE activities.

2. Define the following terms
   Annual Limit on Intake
   The derived limit for the amount of radioactive material taken into the body of an adult worker by inhalation or ingestion in a year.

   High Contamination Area
   Any area where contamination levels are greater than 100 times the values specified in appendix D of this regulation.

   Weighting Factor
   The fraction of the overall health risk, resulting from uniform, whole body irradiation, attributable to specific tissue (T). The dose equivalent to tissue, T, is multiplied by the appropriate weighting factor to obtain the effective dose equivalent contribution from that tissue.

   Quality Factor
   The principal modifying factor used to calculate the dose equivalent from the absorbed dose; the absorbed dose (expressed in rad or gray) is multiplied by the appropriate quality factor (Q).

   Total Effective Dose Equivalent
   The sum of the effective dose equivalent (for external exposures) and the committed effective dose equivalent (for internal exposures). For purposes of compliance with this part, deep dose equivalent to the whole body may be used as effective dose equivalent for external exposures.

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SECTION 2, REQUIREMENTS

In this section, we will describe some requirements related to occupational radiation protection. The material is paraphrased from the regulation contained in this module. Additionally, requirements that are in the regulation but are not in this section may appear in the example, practice, or criterion test. Therefore, it is important that you are familiar with the regulation and this instructional material.

GENERAL RULE

No person shall take or cause to be taken any action inconsistent with the requirements of this regulation or any program, plan, schedule, or other process established by this regulation.

With respect to a particular DOE activity, contractor management shall be responsible for compliance with the requirements of this regulation.

Where there is no contractor for a DOE activity, DOE shall ensure implementation of and compliance with the requirements of this regulation.

Nothing in this regulation shall be construed as limiting actions that may be necessary to protect health and safety.

RADIOLOGICAL UNITS

Unless otherwise specified, the quantities used in the records required by this regulation shall be clearly indicated in special units of curie, rad, or rem, including multiples and subdivisions of these units. The SI units, becquerel (Bq), gray (Gy), and sievert (Sv), are only provided parenthetically in this part for reference with scientific standards. These SI units are not authorized for use in records required under this part.

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RADIATION PROTECTION PROGRAMS (RPP)

The following are requirements related to RPPs.

- The DOE may direct or make modifications to a RPP.
- The content of each RPP shall be commensurate with the nature of the activities performed and shall include formal plans and measures for applying the ALARA process to occupational exposure.
- The RPP shall specify the existing and/or anticipated operational tasks that are intended to be within the scope of the RPP. Except for changes that do not decrease the effectiveness of the RPP, any task outside the scope of a RPP shall not be initiated until an update of the RPP is approved by DOE.
- The content of the RPP shall address each requirement in this regulation.
- The RPP shall include plans, schedules, and other measures for achieving compliance with regulations of this part. Compliance with this part shall be achieved no later than January 1, 1996.
- The RPP for an existing activity shall be submitted to DOE no later than January 1, 1995.
- An update of the RPP shall be submitted to DOE:
  - Whenever a change or an addition to the RPP is made;
  - Prior to the initiation of a task not within the scope of the RPP; or
  - Within 180 days of the effective date of any modifications to this part.
- Changes, additions, or updates to the RPP may become effective without prior Department approval only if the changes do not decrease the effectiveness of the RPP and the RPP, as changed, continues to meet the requirements of this part. Proposed changes that decrease the effectiveness of the RPP shall not be implemented without submittal to and approval by the department.

INTERNAL AUDITS

Internal audits of all functional elements of the radiation protection program shall be conducted no less frequently than every 3 years and shall include program content and implementation.

PLANNED SPECIAL EXPOSURE

A planned special exposure may be authorized for a radiological worker to receive doses in addition to and accounted for separately from the doses received under the limits specified for

general employees, provided that each of the following conditions is satisfied:

- The planned special exposure is considered only in an exceptional situation when alternatives that might prevent a radiological worker from exceeding the limit for general employees are unavailable or impractical.
- The contractor management (and employer, if the employer is not the contractor) specifically requests the planned special exposure, in writing.
- Joint written approval from the appropriate DOE Headquarters program office and the Assistant Secretary for Environment, Safety and Health is received.

Before asking an individual to participate in an authorized planned special exposure, the individual's dose from all previous planned special exposures and all doses in excess of the occupational dose limits shall be determined.

An individual shall not receive a planned special exposure that, in addition to the doses from all previous planned special exposures and all doses in excess of the occupational dose limits, would result in a dose exceeding the following:

- A total effective dose equivalent of 5 rems (0.05 sievert) in the current year; and
- A cumulative total effective dose equivalent of 25 rems (0.25 sievert).

Before a planned special exposure, written consent shall be obtained from each individual involved. Each individual shall be:

- informed of the purpose of the planned operations and procedures to be used,
- informed of the estimated doses and associated potential risks and specific radiological conditions and other hazards which might be involved in performing the task, and
- instructed in the measures to be taken to keep the dose ALARA considering other risks that may be present.

Records of the conduct of a planned special exposure shall be maintained and a written report submitted within 30 days after the planned special exposure to the approving organizations.

The dose from planned special exposures is not to be considered in controlling future occupational exposure limits, but is to be included in records and reports required under this regulation.

CONCENTRATIONS OF RADIOACTIVE MATERIAL IN AIR

The derived air concentration (DAC) values given in appendices A and C of this regulation shall be used to control occupational exposures to airborne radioactive material.

With regard to inhalation exposures and external exposures from airborne radionuclides, compliance with this regulation shall be demonstrated through conformity with the requirements for RPPs and the occupational exposure limits for general employees.

The estimation of internal dose shall be based on bioassay data rather than air concentration values unless bioassay data are:

- unavailable,
- inadequate, or
- internal dose estimates based on representative air concentration values are demonstrated to be as or more accurate.

INDIVIDUAL MONITORING

For the purpose of monitoring individual exposures to external radiation, personnel dosimetry shall be provided to and used by:

Radiological workers who, under typical conditions, are likely to receive one or more of the following:

- An effective dose equivalent to the whole body of 0.1 rem (0.001 sievert) or more in a year;
- A shallow dose equivalent to the skin or to any extremity of 5 rems (0.05 sievert) or more in a year;
- A lens of the eye dose equivalent of 1.5 rems (0.015 sievert) or more in a year; or
- A deep dose equivalent from external exposures to any organ or tissue other than the lens of the eye of 5 rems (0.05 sievert);

Declared pregnant workers who are likely to receive from external sources a dose equivalent to the embryo/fetus in excess of 10 percent of the applicable limit for the embryo/fetus.

Minors and members of the public likely to receive, in 1 year, from external sources, a dose in excess of 50 percent of the applicable limits.

For the purpose of monitoring individual exposures to internal radiation, internal dose evaluation programs (including routine bioassay programs) shall be conducted for:

Radiological workers who, under typical conditions, are likely to receive 0.1 rem (0.001 sievert) or more committed effective dose equivalent, and/or 5 rems (0.05 sievert) or more committed dose equivalent to any organ or tissue, from all occupational radionuclide intakes in a year.

Declared pregnant workers likely to receive an intake resulting in a dose equivalent to the embryo/fetus in excess of 10 percent of the limit.

Minors and members of the public who are likely to receive, in 1 year, an intake resulting in a committed effective dose equivalent in excess of 50 percent of the limits.

RADIOACTIVE CONTAMINATION CONTROL AND MONITORING

Instruments and techniques used for radioactive contamination monitoring and control shall be adequate to ensure compliance with the requirements.

Appropriate controls shall be maintained and verified that prevent the inadvertent transfer of removable contamination to locations outside radiological areas under normal operating conditions.

Any area in which contamination levels exceed the values specified shall be:

Posted according to requirements contained in this regulation; and

Controlled in a manner commensurate with the physical and chemical characteristics of the contaminant, the radionuclides present, and the fixed and removable contamination levels.

Areas with fixed contamination exceeding the total radioactivity values specified may be located outside radiological areas provided the following conditions are met:

- Removable contamination levels are below the levels specified.
- Unrestricted access to the area is not likely to cause any individual to receive a total effective dose equivalent in excess of 0.1 rem (0.001 sievert) in a year.
- The area is routinely monitored.
- The area is clearly marked to alert personnel of the contaminated status.
- Appropriate administrative procedures are established and exercised to maintain control of these areas.
- Dose rates do not exceed levels that would require posting.

Appropriate monitoring to detect and prevent the spread of contamination shall be performed by individuals exiting radiological areas established to control removable contamination and/or airborne radioactivity.

Protective clothing shall be required for entry to areas in which removable contamination exists at levels exceeding those specified.

ENTRY CONTROL PROGRAM

Radiological areas

Personnel entry control shall be maintained for each radiological area.

The degree of control shall be commensurate with existing and potential radiological hazards within the area.

One or more of the following methods shall be used to ensure control:

Signs and barricades;
Control devices on entrances;
Conspicuous visual and/or audible alarms;
Locked entrance ways; or
Administrative controls.

Administrative procedures shall be written as necessary to demonstrate compliance with the provisions. These administrative procedures shall include actions essential to ensure the effectiveness and operability of barricades, devices, alarms, and locks. Authorizations shall be required to perform specific work within the area and shall include specific radiation protection measures.

No control(s) shall be installed at any radiological area exit that would prevent rapid evacuation of personnel under emergency conditions.

High and Very High Radiation Areas

High radiation areas

One or more of the following features shall be used for each entrance or access point to a high radiation area where radiation levels exist such that an individual could exceed a deep dose equivalent to the whole body of 1 rem (0.01 sievert) in any one hour at 30 centimeters from the source or from any surface that the radiation penetrates:

A control device that prevents entry to the area when high radiation levels exist or upon entry causes the radiation level to be reduced below that level defining a high radiation area;

A device that functions automatically to prevent use or operation of the radiation source or field while personnel are in the area;

A control device that energizes a conspicuous visible or audible alarm signal so that the individual entering the high radiation area and the supervisor of the activity are made aware of the entry;

Entryways that are locked. During periods when access to the area is required, positive control over each entry is maintained;

Continuous direct or electronic surveillance that is capable of preventing unauthorized entry; or

A control device that will automatically generate audible and visual alarm signals to alert personnel in the area before use or operation of the radiation source and in sufficient time to permit evacuation of the area or activation of a secondary control device that will prevent use or operation of the source.

Very high radiation areas

In addition to the above requirements, additional measures shall be implemented to ensure

individuals are not able to gain access to very high radiation areas when dose rates are in excess of the posting requirements.

No control(s) shall be established in a high or very high radiation area that would prevent rapid evacuation of personnel.

INDIVIDUAL MONITORING RECORDS

Records shall be maintained to document doses received by all individuals for whom monitoring was required and doses received during planned special exposures, accidents, and emergency conditions.

The results of individual external and internal dose measurements that are performed, but are not required, shall be recorded. Recording of the non-uniform shallow dose equivalent to the skin caused by contamination on the skin is not required if the dose is less than 2 percent of the limit specified for the skin per the regulations.

The records required by this section shall:

be sufficient to evaluate compliance with exposure limits for general employees;

be sufficient to provide dose information necessary to complete reports required by subpart I of this part and by departmental requirements for occurrence reporting and processing;

include the following quantities for external dose received during the year:

- The effective dose equivalent from external sources of radiation (deep dose equivalent may be used as effective dose equivalent for external exposure)
- The lens of the eye dose equivalent
- The shallow dose equivalent to the skin
- The shallow dose equivalent to the extremities

include the following quantities for internal dose resulting from intakes received during the year:

- Committed effective dose equivalent
- Committed dose equivalent to any organ or tissue of concern
- Estimated intake and identity of radionuclides

include the following quantities for the summation of the external and internal dose:

- Total effective dose equivalent in a year;
- For any organ or tissue assigned an internal dose during the year, the sum of the deep dose equivalent from external exposures and the committed dose equivalent to

that organ or tissue; and
- Cumulative total effective dose equivalent received from external and internal sources while employed at the site or facility, since January 1, 1989.

include the dose equivalent to the embryo/fetus of a declared pregnant worker.

Documentation of all occupational exposure received during the current year shall be obtained when demonstrating compliance with the requirements of this regulation. In the absence of formal records of previous occupational exposure during the year, a written estimate signed by the individual may be accepted.

Efforts shall be made to obtain records of prior years occupational internal and external exposure.

The records specified in this section that are identified with a specific individual shall be readily available to that individual.

Data necessary to allow future verification or reassessment of the recorded doses shall be recorded.

All records required by this section shall be transferred to the DOE upon cessation of activities at the site that could cause exposure to individuals.

MONITORING AND WORKPLACE RECORDS

The following information shall be documented and maintained:
- Results of surveys for radiation and radioactive material in the workplace;
- Results of surveys, measurements, and calculations used to determine individual occupational exposure from external and internal sources;
- Results of surveys for the release of material and equipment; and
- Results of maintenance and calibration performed on:
  - Instruments used for area monitoring and contamination control; and
  - Devices used for individual monitoring.

ADMINISTRATIVE RECORDS

Training records shall be maintained, as necessary, to demonstrate compliance with the requirements of this regulation.

Actions taken to maintain occupational exposures as low as reasonably achievable, and facility design and control actions shall be documented.
Records shall be maintained to document the results of internal audits and other reviews of program content and implementation.
Written declarations of pregnancy shall be maintained.
Changes in equipment, techniques, and procedures used for monitoring in the workplace shall be documented.

DESIGN AND CONTROL

Measures shall be taken to maintain radiation exposure is controlled ALARA through facility and equipment design and administrative control. The primary methods used shall be physical design features. For specific activities where use of physical design features are demonstrated to be impractical, administrative controls and procedural requirements shall be used to maintain radiation exposures ALARA.

FACILITY DESIGN AND MODIFICATIONS

During the design of new facilities or modification of old facilities, the following objectives shall be adopted:

- Optimization methods shall be used to ensure that occupational exposure is maintained ALARA in developing and justifying facility design and physical controls.
- The design objective for controlling personnel exposure from external sources of radiation in areas of continuous occupational occupancy (2000 hours per year) shall be to maintain exposure levels below an average of 0.5 mrem (5 microsieverts) per hour and as far below this average as is reasonably achievable. The design objectives for exposure rates for potential exposure to a radiological worker where occupancy differs from the above shall be ALARA and shall not exceed 20 percent of the applicable standards.
- Regarding the control of airborne radioactive material, the design objective shall be, under normal conditions, to avoid releases to the workplace atmosphere and in any situation, to control the inhalation of such material by workers to levels that are ALARA; confinement and ventilation shall normally be used.
- The design or modification of a facility and the selection of materials shall include features that facilitate operations, maintenance, decontamination, and decommissioning.

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CONTROL PROCEDURES

During routine operations, the combination of design features and administrative control procedures shall provide that:

- the anticipated magnitude of the total effective dose equivalent shall not exceed 5 rems (0.05 sievert) in a year;
- the anticipated magnitude of the committed dose equivalent to any organ or tissue, plus any deep dose equivalent from external exposure, shall not exceed 50 rems (0.5 sievert) in a year; and
- exposure levels are ALARA.

Compliance with the requirements in this section shall be demonstrated by appropriate monitoring.

EMERGENCY EXPOSURE SITUATIONS

The risk of injury to those individuals involved in rescue and recovery operations shall be minimized.

Operating management shall weigh actual and potential risks to rescue and recover individuals against the benefits to be gained.

Rescue action that might involve substantial personal risk shall be performed by volunteers.

The dose limits for individuals performing these operations are as follows:

Guidelines for Control of Emergency Exposures

Dose limit whole body*	Activity performed	Conditions
5 rems	All	.....
10 rems ...	Protecting major property ...	Where lower dose limit not practicable.
25 rems ...	Lifesaving or protection of large populations	Where lower dose limit not practicable.
>25 rems	Lifesaving or protection of large populations	Only on a voluntary basis to personnel fully aware of the risks involved.

* The lens of the eye dose limit is three times the listed values. The shallow dose limit to the skin of the whole body and the extremities is ten times the listed values. These doses are in addition to and accounted for separately from the doses received under the limits for general employees.

Each individual selected shall be trained and briefed beforehand of the known or anticipated hazards to which the individual will be subjected.

Note: You do not have to do example 2 on the following page, but it is a good time to check your skill or knowledge of the information covered. You may do the example or go to the practice.

EXAMPLE 2

1. Identify the position that is responsible for compliance with 10 CFR 835.

2. Identify the units of measure that are authorized for use in records maintained for 10 CFR 835.

3. Describe three conditions that require an RPP update.

Note: When you are finished, compare your answers to those contained in the example 2 self-check. When you are satisfied with your answers, go on to Section 3

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EXAMPLE 2 SELF-CHECK

1. Identify the position that is responsible for compliance with 10 CFR 835.
   Contractor management

2. Identify the units of measure that are authorized for use in records maintained for 10 CFR 835.
   Curie, rad or rem, including multiples and subdivisions of these units.

3. Describe three conditions that require an RPP update
   An update of the RPP shall be submitted to DOE:
   - whenever a change or an addition to the RPP is made;
   - prior to the initiation of a task not within the scope of the RPP; or
   - within 180 days of the effective date of any modifications to this part.

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This practice is required if your proficiency is to be verified at the familiar or general level. This practice will prepare you for the criterion test that will be required if your proficiency is to be verified at the general level. You will need to refer to the Orders to answer the questions in the practice correctly. The practice and criterion test will also challenge additional skills that you have acquired in other formal and on-the-job training.

PRACTICE

1. Define the following terms.
   Airborne radioactive material area

   Bioassay

   Declared pregnant worker

Occupational exposure

Collective dose

Internal dose

Whole body

2. State the required frequency of internal audits of the radiation protection plan.

3. State the conditions that must be satisfied before a radiological worker can be authorized for a planned special exposure.

4. Identify the basis for estimating internal dose..

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5. State the conditions under which internal dose evaluation programs shall be performed for the following groups
   - radiological workers
   - declared pregnant workers
   - minors and members of the public

6. State the entry control program requirements for the following areas.
   - radiological area
   - high radiation area
   - very high radiation area

7. Identify the information that must be documented and maintained to comply with monitoring and workplace records requirements.

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8. State the primary design method to maintain radiation exposure in controlled areas ALARA.

9. State the anticipated magnitude of radiation levels during routine operations.

10. Identify three considerations or judgments in case of an emergency exposure situation.

Note: The course manager will check your practice and verify your success at the familiar level. When you have successfully completed this practice, go to the general level.

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Date: 6/5/98

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OCCUPATIONAL RADIATION PROTECTION
GENERAL LEVEL

OBJECTIVES

Given the Familiar Level of this module, and a scenario, you will be able to perform the following:

1. List the key elements you would look for in the contractor's action plan to correct the situation described in the scenario; and

2. State which requirements, sections, or elements of 10 CFR 835 apply to the situation described in the scenario.

Note: If you think that you can complete the practice at the end of this level without working through the instructional material and/or the examples, complete the practice now. The course manager will check your work. You will need to complete the practice in this level successfully before taking the criterion test.

RESOURCES

DOE Orders Self-Study Program, 10 CFR 835, Familiar Level, 6/3/98.
10 CFR 835, Occupational Radiation Protection, 12/14/93.
.

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10 CFR 835
Level: General
Date: 6/5/98

INTRODUCTION

The Familiar Level of this module introduced the purpose and scope of 10 CFR 835. Several definitions and the requirements associated with the regulation were discussed. In the General Level of this module, students are asked to apply the information contained in the Familiar Level and the regulation to a scenario related to the regulation. Please refer to the resources listed on the previous page to make your analysis and answer the questions. You are not required to complete the example. However, doing so will help prepare you for the practice and criterion test.

Note: You do not have to do the example on the following page, but it is a good time to check your skill and knowledge of the information covered. You may do the example or go on to the practice.

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EXAMPLE SCENARIO

Please review the following scenario, and then answer these questions.

1. Is the contractor's action plan correct? If not, state what should have been done.
2. Were the correct documents or requirements cited? If not, state the correct documents or requirements.

SCENARIO
On June 17, 1996, a custodial cleaning crew entered and worked in a posted radioactive materials area without proper authorization. The crew cleaned and waxed the floor in a laboratory room. Part of the laboratory room was also posted as a radioactive materials management area and contained radioactive material in the form of metal tritides. When the room owner and a radiological control technician discovered that it had been entered and cleaned, they surveyed the room and two others cleaned afterward for tritium contamination. They found no contamination; however, the breakdown in access control could have resulted in personnel exposure to radiation and spread of contamination.

An investigation of the situation revealed the following.

- The laboratory room was posted with signs indicating "Controlled Area," "Radioactive Materials Area," "Rad Worker I Training Required," and "Tritium."
- Another sign on the door stated that the room was a security limited-access area and that all visitors to the room must be escorted by laboratory owners. The laboratory owner's name and phone numbers were posted on the door.
- The custodial crew posted a sign on the laboratory door on May 24 that scheduled the area for cleaning on May 28. However, the laboratory owner, who resides in another building, did not see the sign.
- Security entry to the laboratory was controlled by a cipher lock, but a security officer allowed the crew access without regard to the postings.
- The custodial crews work in the facility after normal working hours, and they post signs on doors for areas that are to be cleaned. If no one responds, they proceed with the cleaning.
- The crew supervisor, custodians, and security officer were all current on the general employee radiological training because they were classified as general employees. However, none had Radiation Worker I training.

- The custodians were considered visitors and required authorized escorts.
- Investigators believe the working environment at the laboratory was one in which posting requirements were not adequately implemented and enforced.

Actions taken by the contractor

- The custodial cleaning crew was directed: (1) not to enter areas or rooms that have radiation or other Environment, Safety, and Health hazard signs without meeting posted requirements, (2) to comply with all hazard signs when performing their duties, and (3) to consult with their supervisor before performing their duties when unsure of the status of areas.
- The custodial cleaning crew immediately received refresher general employee radiological training, which includes training on postings.
- A root-cause analysis will be conducted to identify further corrective actions.

Requirements applicable to this situation:

10 CFR 835, Section 835.501
Personnel entry control shall be maintained for each radiological area.

Take some time to review the example scenario and the contractor actions taken to correct the situation. Then decide if all the correct actions were considered and if the appropriate requirements (from those included in this module) were selected. Write your answer below, and then compare your answer to the one contained in the example self-check.

EXAMPLE SELF-CHECK

Your answer does not have to match the following exactly. You may have added more corrective actions or cited other requirements that apply. To be considered correct, your answer must include at least the following.

The actions listed are correct. One additional action should be considered. Security officer training should be reviewed and job- and site-specific training should be developed.

The requirement cited is correct. There are two additional requirements that should have been mentioned.

10 CFR 835, Section 835.603
Each access point to a radiological area shall be posted with conspicuous signs bearing the working provided in this section.

10 CFR 835, Subpart J, paragraph (a)
All general employees shall be trained in radiation safety prior to receiving occupational exposure during access to controlled areas.

Change No: 0
10 CFR 835
Level: General
Date: 6/5/98

PRACTICE

This practice is required if your proficiency is to be verified at the General Level. The practice will prepare you for the criterion test. You will need to refer to the Order to answer the questions in the practice correctly. The practice and criterion test will also challenge additional analytical skills that you have acquired in other formal and on-the-job training.

Please review the following scenario and answer the following questions.

1. Was the situation handled correctly? If not, what should have been done?
2. Was the list of requirements, sections, and elements complete and correct? If not, state the correct or omitted requirements.

SCENARIO

On 9/26/94 members of the dosimetry evaluation group informed the facility manager and facility representative that about 30 twenty-four hour urine samples, that had been held for three years, were not properly analyzed. Additionally, another 90 twenty-four hour urine samples have not been analyzed in over a year's time and procedures were not available to ensure that they would be properly analyzed or even could be properly analyzed. In the questioning that followed, the inability to analyze samples of a number of isotopes was identified.

An investigation of the situation revealed the following.

- The investigation committee determined that these samples were collected from two jobs. On previous work it was possible to obtain outside analyses from another DOE Laboratory. This laboratory became concerned about competing with private enterprise and felt they could not continue performing the analyses.
- Some of the individuals whose samples were to be analyzed had left the company and had requested the results of the analysis.
- There was no direction about how to contract with another laboratory. There were no requirements that the transfer of work to another laboratory had to occur within a specified time period. There were no policies that established responsibility for the dosimetry process. So, when samples were collected no one knew when, or if a dose needed to be calculated. Therefore, the dose evaluators were unable to follow-up, because of not knowing what samples were submitted for dose calculations. No one was assigned responsibility for the entire program.

- Numerous upper level documents at the facility require a dosimetry program, including bioassay to determine any exposures during work. The fact that the procedures were not in place to ensure the analysis and oversight of these samples shows that these policies were not implemented. The lack of clear responsibility, as to whose job it was to ensure that samples are analyzed and doses calculated, once samples are submitted, is an example of the problem.
- The lack of communication and this includes all forms, not just verbal, is evidenced by the fact that samples were kept in the laboratory for up to three years without analysis. Personnel were aware, but the fact was not pursued sufficiently to obtain the desired actions.
- Management at higher levels was unaware of samples not analyzed, lack of procedures to implement the program, and the lack of definition as to responsibilities in the program, are all indications of lack of management support.

The contractor performed the following corrective actions.

- Defined responsibilities for bioassay/dose process.
- Developed auditable method of tracking bioassay samples.
- Developed chain-of-custody procedure.
- Updated policy procedure manual for all policies involving bioassay/dose evaluation.
- Reviewed all areas for lack of administrative control and communication breakdown.

Applicable requirements:

10 CFR 835, Subpart E, Section 835.402, paragraph (c) and (d)
For the purpose of monitoring individual exposures to internal radiation, internal dose evaluation programs including routine bioassay programs shall be conducted.

Internal dose evaluation programs shall be adequate to ensure that the established limits are not exceeded.

Take some time to review the scenario and the actions the contractor took or did not take to correct the situation. Then decide if the contractor's actions were complete and correct. Finally, determine if the requirements, sections, or elements cited in the scenario were correct.

Use the space below to write your answer and then bring the completed practice to the course manager for review.

Note: The course manager will check your practice and verify your success at the General Level. When you have successfully completed this practice, the course manager will give you the criterion test.